EXHIBIT B

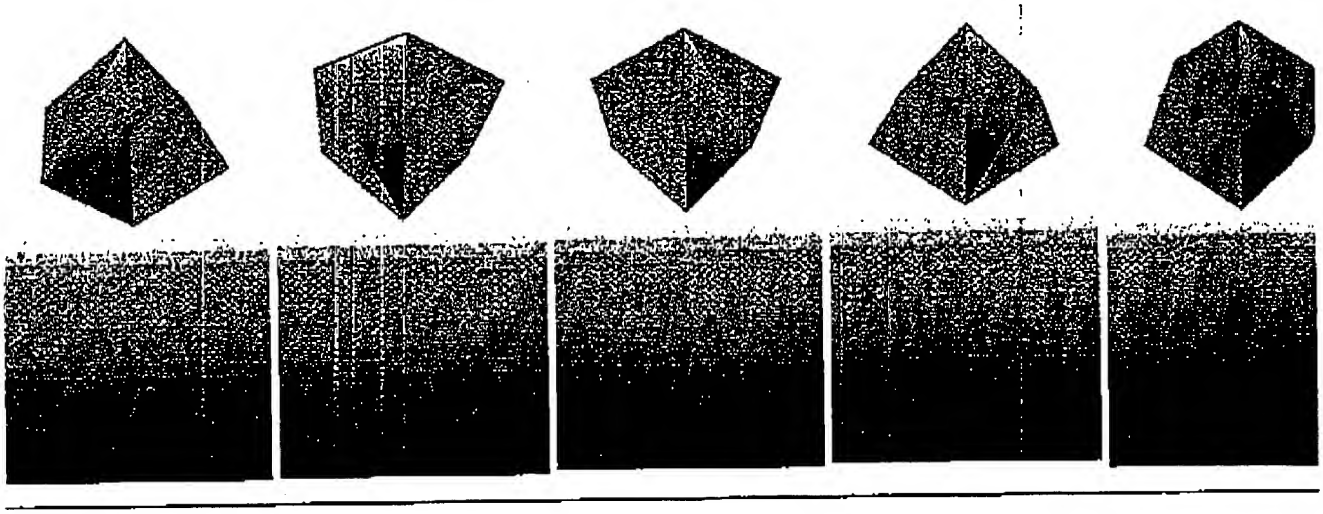
Color Theory

As a compliment to the definitions found in the Color Glossary, we will now develop some of the terms that were presented there. This article echoes the definitions read earlier but takes a more mathematical and scientific approach to color. And remember, all of these ideas still tie back to the COLORCUBE model and the theory that surrounds it.

Color is a phenomenon of light caused by how our eyes detect differing qualities of projected or reflected light. Because science and technology has allowed us to understand the physiology of the human eye, to measure wavelengths of light and chart energy patterns, we have come a long way in grasping the complexities of color. Please find below how we define the dimensions of color in terms of hue, lightness, saturation and other characteristics of light. While this article is not the most comprehensive text on color, we hope it serves to increase your understanding of it.

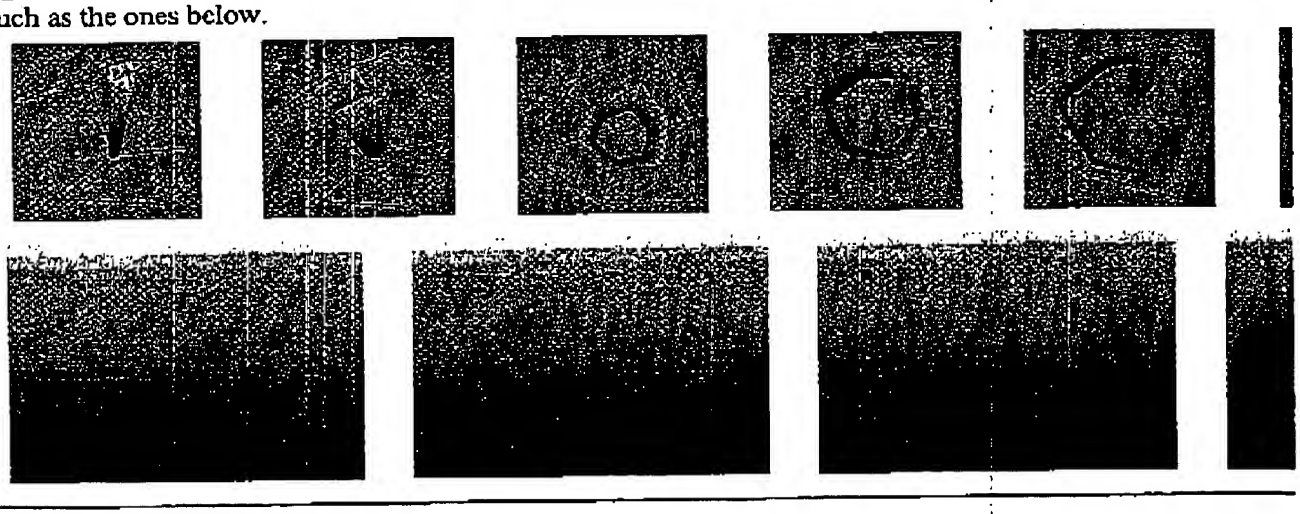
For more illustrations, please see the write-up on the Dimensions of Color Screensaver.

Hue: This term describes the distinct characterisitic of color that distinguishes red from yellow from blue. These hues are largely dependent on the dominant wavelength of light that is emitted or reflected from an object. For instance, the range of visible light is generally between Infrared Light (~700nm wavelength) and Ultraviolet Light (~400nm wavelength). In the diagram to the right is a color spectrum that shows this range along with two hue groups (red and blue) known as "tonal families." From the spectrum, any pure hue can be mixed with white, black or gray to yield a tonal family. Note that within the tonal family are colors of different lightness, chroma, and saturation. These plots are illustrated below within the context of a cube model and a 2D graph (mapping value vs. chroma, constant saturation).



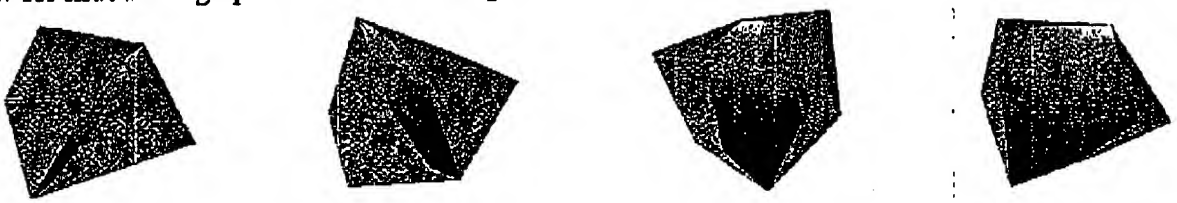
Chromaticity: Highly chromatic colors contain maximum hue with little or no impurities such as white, black or gray. The colors at the outer edge of the COLORCUBE model that do not touch white or black contain maximum chroma. The degree to which a color is free from being mixed with other colors is a good indication of its chromaticity.

Often referred to as "colorfulness," chroma is the amount of identifiable hue in a color. A color without hue is achromatic or monochromatic and will appear gray. For most colors, as the brightness increases, the chroma of each increases as well, except with the very light colors. Perhaps the easiest way to grasp this difficult concept is to visualize a graph such as the ones below.



Saturation: Also known as "intensity," saturation describes the strength of a color with respect to its value or lightness. What that means is a color's saturation is the degree to which it is different than gray at a given lightness. For instance, colors near middle gray are relatively unsaturated compared to brighter, more vibrant colors like those found on the outer edges of the COLORCUBE.

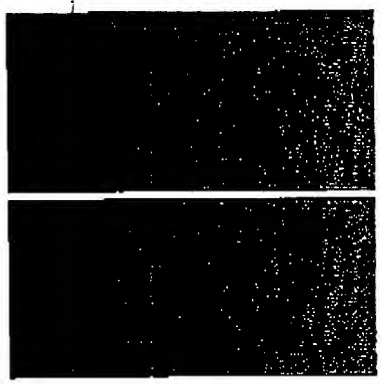
While it is fair to say that the condition of being full or vivid is merely a color's freedom from dilution by gray or its complement, it is important to note that saturation is measured along the lines of equal value or lightness. Please see the diagrams above and below for illustrated graphs and cube drawings demonstrating saturation.

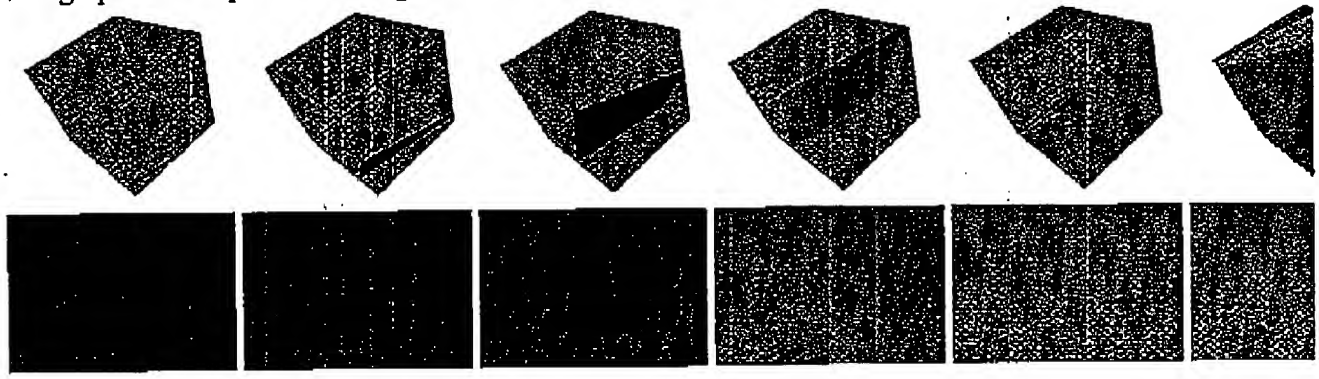


Value: The value or brightness of a color is based on the amount of light eminating from the color. The easiest way to remember this dimension of color is to visualize the "grayscale," which runs from black to white and contains all of the possible monochromatic grays. The brighter the color is, the higher its value. So a royal purple has less value, emits less light, than a sky blue. We can equate this grayscale to a color chart using the same equation as the televisions employ:

Gray Color Value = 0.30 Red + 0.59 Green + 0.11 Blue

See the diagrams to the right for a comparison of these equivalent scales. The graphs below plot increasing value in two and three dimensions.





Luminance. This dimension of color is related to value but is distinct in its mathematical definition. The luminance or lightness of a color measures the intensity of light per unit area of its source. We calculate it by taking the average of a series of achromatic colors. Suffice to say that luminance runs from very dim (dark) to very bright (dazzling) and can be best represented by a color wheel, which shows all of the hues with equal luminance. If more light were added to a color wheel, we would see the intensity of light increase and thus, the luminance would also increase. The opposite would occur if light was reduced. Compare the planes of luminance, shown on the right, to the planes of value, above to get a clear understanding of this difficult concept.